APRIL/MAY 2023

GOPH25A/ DOPH25A — SPECTROSCOPY AND LASERS

Time : Three hours

Maximum : 75 marks

Shanmuga Industries Arts & Science College
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SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is microwave spectroscopy?

2. Give an example of symmetric top molecules.

3. Sketch a diagram to show the mode of vibrations of CO_2 molecule.

4. Define Normal Modes.

5. Write the differences between Raman spectra and IR spectra?

6. List some application of Raman spectroscopy.

7. Write down the properties of lasers.

8. What is the condition for light amplification.

9. Name two gas laser.

10. Write down any two applications of CO_2 laser.

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SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) With energy level diagram explain the Rotational Spectra of a diatomic rigid rotator.

Or

(b) Outline the applications of a microwave spectroscopy.

12. (a) Explain the principles instrumentation of file.

Or

(b) Explain the normal modes of molecular vibrations.

13. (a) Explain classical theory of the Raman effect.

Or

(b) Discuss rotational Raman spectra.

14. (a) Obtain Einstein's A and B coefficients.

Or

(b) Explain population inversion.

15. (a) With suitable energy level diagram explain the working of Ruby laser.

Or

(b) Discuss any two industrial applications of laser.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Describe the design of a microwave spectrometer.

17. Briefly discuss the vibrational spectra of a diatomic molecule and a polyatomic molecule.

18. Explain the principle and instrumentation of Laser Raman spectrometer.

19. Explain three level and four level laser systems.

20. Describe the construction of He-Ne laser and explain its energy levels diagram.
